

A Revision of the *Nipponicella* Complex of the Genus *Phyllonorycter*, with Description of a New Species (Lepidoptera, Gracillariidae)

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Abstract The *Phyllonorycter nipponicella* complex, including *P. nipponicella* (ISSIKI), *P. acutissimae* (KUMATA) and *P. similis* sp. nov. (= *Lithocolletis nipponicella*: KUMATA, 1963 and 1966), is revised. The host association and distribution of the complex are discussed.

In the course of a revisional study of *Phyllonorycter* species feeding on oaks in Japan and Korea, I have found that I (KUMATA, 1963, 1966) confused 2 species under the name *Lithocolletis* (= *Phyllonorycter*) *nipponicella* ISSIKI, which are distinguishable only by genital structures. One of them is truly *P. nipponicella*, whereas the other, represented by the majority of the specimens I identified with *nipponicella*, has proved to be an undescribed species. These species, together with *P. acutissimae* (KUMATA), may form a group, the *nipponicella* complex, closely agreeing in colour pattern. Based mostly on reared material, a preliminary discussion will be given on the host association and geographical distribution of these species.

Most of the specimens studied were collected and reared by me and are deposited in the Entomological Institute, Hokkaidô University, Sapporo. Collectors and depositories are cited for other specimens. Depositories of borrowed specimens are abbreviated as follows: —EUOP: Entomological Laboratory, University of Osaka Prefecture, Sakai, Japan; KIAS: Institute of Agricultural Sciences, Suweon, Korea; and USNM: U.S. National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Phyllonorycter nipponicella Complex

The *nipponicella* complex includes 3 species, *P. nipponicella*, *P. acutissimae* and *P. similis* (sp. nov.), which so closely agree in colour pattern that they hardly be distinguished externally. In addition, their larvae make very similar leaf mines on oaks (*P. acutissimae* also mines in chestnut leaves), the mines being tentiform and situated on the underside between 2 lateral leaf veins.

The salient features of the colour pattern shared by the species of the *nipponicella* complex are as follows: —Fore wing clear golden-ochreous, with a transverse median fascia, 3 longitudinal basal streaks that are usually detached from the median fascia, and 3 costal and 2 dorsal strigulae, all brilliant white, the fascia and strigulae being dark-edged on their basal margins; fringe-line in cilia blackish, narrow, and running from 3rd costal strigula to the 1st dorsal; thorax with 3 longitudinal, white stripes

on dorsum, the median one broad and occupying about 1/3 width of mesonotum; tuft on head white, sparsely mixed with ochreous hairs on sides.

P. kamijoi (KUMATA) and *P. cretata* (KUMATA) are similar to the *nipponicella* complex in colour pattern, and their larvae are also leaf miners on oaks and chestnut trees. However, in *P. kamijoi* there is a curved mark on the fore wing formed by the confluent costo-basal streak and median fascia, and in *P. cretata* the median thoracic stripe is always narrower than 1/4 width of the mesonotum. Thus, they can be readily separated from the species of the *nipponicella* complex.

The following keys are exclusively based upon genitalia, because there are no characters other than genital ones that can serve for separating the species. The female of *P. nipponicella* is unknown. One female specimen at hand may belong to *P. nipponicella* so far as based on its collecting data, but its genitalia nearly agree with those of a long series of the female specimens examined of *P. similis*. In this paper it will be provisionally identified as *P. similis*.

Keys to the Species of the *Nipponicella* Complex

I. Based on male genitalia

1. Aedoeagus (Fig. 4, G–J) with a very large apical barb; flap-like 8th sternite (Fig. 5, A–D) more or less tapering towards apex, with apical margin shallowly or moderately concave or incised.....2
- Apical barb of aedoeagus (Fig. 4, K–L) very minute or absent; flap-like 8th sternite (Fig. 5, E–F) almost parallel-sided or slightly widened apically, with apical margin more deeply concave; [valva (Fig. 4, E–F) with setae distributed densely on ventral half of disc near and at apex and rather sparsely on central part of disc from middle to base of valva].....*P. acutissimae* (KUMATA)
2. Valva (Fig. 4, A–B) with setae arranged in a row along ventral and apical margins, and also in irregular longitudinal rows on disc just above middle, thus discal area of valva near apex not broadly setose.....*P. nipponicella* (ISSIKI)
- Valva (Fig. 4, C–D) with setae distributed almost over whole disc at apical half of valva.....*P. similis* sp. nov.

II. Based on female genitalia (excluding *nipponicella*)

1. Sinus vaginalis (Figs. 2, B; 5, G) very wide, usually more than half as wide as 8th abdominal segment; sterigma with a heavily sclerotized band running transversely on ventrum and arched anteriorly; inner surface of bulla seminalis (Fig. 2, D) covered with microscopic spines.....*P. similis* sp. nov.
- Sinus vaginalis (Figs. 3, B; 5, H) only moderately wide, at most occupying half width of 8th abdominal segment; sterigma weakly sclerotized on its caudal half, without such a transverse band; bulla seminalis (Fig. 3, D) without any spines...
.....*P. acutissimae* (KUMATA)

Phyllonorycter nipponicella (ISSIKI)

(Figs. 1; 4, A–B & G–H; 5, A–B; 6, A)

Lithocolletis nipponicella ISSIKI, 1930, Ann. Mag. nat. Hist. 10(6): 430; *ibid.*, 1950, Icon. Ins. Jap.:

454, fig. 1225; *ibid.*, 1957, *Icon. Heteroc. Jap. Col. Nat.* 1: 27, pl. 4 (97); KUMATA, 1963, *Ins. matsum.* 25: 79 (part).

♂. Expanse of wings: 7.5 mm in early generations; 8.0–8.2 mm in late generations. Length of fore wing: 3.5 (in holotype)–3.7 mm in early generations; 3.9–4.0 mm in late generations.

Colour: Face, head and palpi brilliant white; tuft on head snow-white, sparsely mixed with ochreous hairs at sides. Antenna whitish, slightly tinged with ochreous colour, with apical 2 or 3 segments blackish; scape and pecten snow-white, the former narrowly lined above with ochreous-brown. Thorax golden-ochreous on dorsal face, with a white median line occupying about 1/3 width of mesonotum; tegula white, with its anterior margin golden-ochreous narrowly; pleural and ventral faces whitish. Legs ochreous-whitish; fore femur and tibia conspicuously blackish on upper side; fore tarsus white, with 2 rather broad blackish rings; mid tarsus with 2 indistinct dark rings; hind tibia somewhat darkened on outer side.

Fore wing clear golden-ochreous, with markings brilliant white; medio-basal streak nearly parallel with costal margin of wing, reaching about basal 2/5 length of wing, narrow on entire length, and edged above and around tip with dark brown; costo-basal streak a little shorter than or rarely as long as medio-basal one, edged with dark brown on both sides; dorso-basal streak about 2/3 as long as medio-basal one, slightly widened apically; median fascia rather broad, roundly arched or bluntly angulated outwardly just above central disc of wing, conspicuously edged with dark brown or black internally, and detached from basal streaks; 3 costal strigulae placed equidistantly between median fascia and apex of wing, wedge-shaped, and edged with dark brown or black internally; a dorsal strigula situated at tornus or opposite 1st costal strigula, triangular, larger than costal strigulae, edged with black internally; an indistinct whitish mark at middle of termen, not produced beyond fringe-line; apical dot black, minute and round; cilia ochreous-whitish, with fringe-line narrow, blackish, and extending from 3rd costal strigula to the 1st dorsal. Hind wing gray, with cilia ochreous-whitish or grayish.

Genitalia: Symmetrical. Tegumen simple, tapering towards acutely pointed apex; tuba analis covered with microspines on its apical area. Valva bag-shaped; in material mounted on slide, costal margin strongly arched, ventral margin slightly incurved, and apex broadly round; costal process produced from basal extremity of costa, small, conical, with a filament-like seta about 2/3 as long as valva; many slender to moderately stout setae arranged nearly in a row along ventral and apical margins and also in irregular longitudinal rows on disc just above middle, thus the discal area of valva near apex not broadly setose. Saccus short, broadly truncated apically. Flap-like 8th sternite a little shorter than valva, nearly parallel-sided or slightly narrowed apically, with apical margin moderately incised or concave. Aedoeagus a little longer than valva, narrow, tubular, nearly straight, with a large, pointed apical barb. (Ten slides examined.)

♀. Unknown.

Specimens examined: 10♂♂. Type-specimens: Holotype — ♂ (USNM), labelled “Kinki-Kii, Hasimoto, 12/viii/1919, S. ISSIKI; *Lithocolletis nipponicella* ISSIKI, Type; Genitalia slide no. Grc-2907, KUMATA”. Paratype — 1♂ (USNM), labelled “Kinki, Kii, Hasimoto, 17/iv/1920 em., S. ISSIKI; *Lithocolletis nipponicella* ISSIKI,

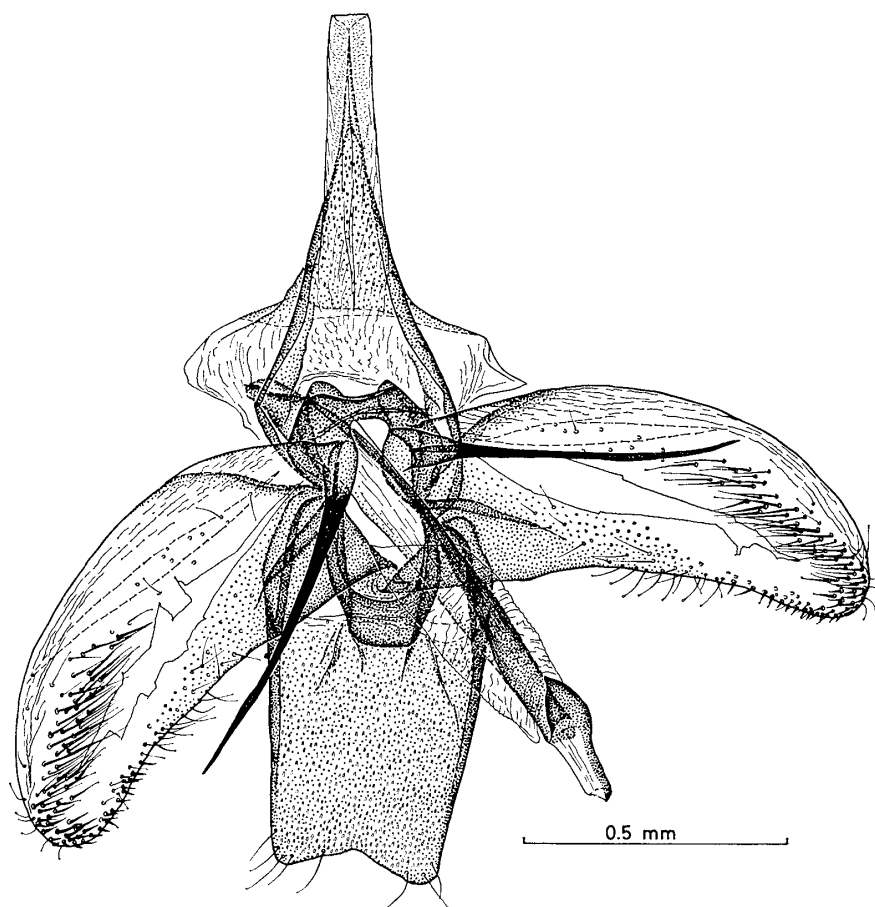


Fig. 1. *Phyllonorycter nipponicella* (Issiki). Male genitalia (holotype, Grc-2907).

Paratype; Genitalia slide no. Grc-2908, KUMATA''.

Further specimens: HONSYÛ—1♂, Nagano-si, em. 7/iv/1958, ex *Quercus acutissima*, K. KAMIJO leg., determined as *nipponicella* by KUMATA, 1961; 1♂, Misuzuko, Nagano-ken, em. 8/iv/1958, ex *Q. acutissima*, K. KAMIJO leg., determined as *nipponicella* by KUMATA, 1961; 2♂♂ (EUOP), Mt. Iwawaki, Ôsaka, em. 2/ii-6/iii/1980, ex *Q. acutissima*, H. KUROKO leg.; 1♂, Sasayama, Hyôgo-ken, em. 1/vii/1965, ex *Q. acutissima*. KOREA—1♂ (KIAS), Suweon, 10/v/1976, K. T. PARK leg.; 1♂ (KIAS), ditto, 23/vi/1977, B. Y. LEE leg.; 1♂ (EUOP), ditto, em. 27/vi/1977, ex *Q. variabilis*, H. KUROKO leg.

Food plants: *Quercus acutissima* (Fagaceae) in Japan, and *Quercus variabilis* in Korea. The following food plants recorded for this species by me in 1963 and 1966 should be emended as for *P. similis*: *Quercus mongolica* var. *grosseserrata*, *Q. serrata* and *Q. dentata*.

Distribution: Japan (Honsyû); and Korea (new record). Also recorded by me (1963, 1966) from Hokkaidô, Shikoku, Kyûsyû and Satunan Is., but these records should be referred to *P. similis*. ERMOLAEV (1977) recorded this species from Primorskiy Kray, U.S.S.R., but I have some doubt about his identification.

Comments: According to ISSIKI (1930), 2 of the 6 paratypes of *P. nipponicella* were collected from Sapporo, Hokkaidô. I have great doubt about this record, be-

cause I have not found the true *P. nipponicella* in Sapporo in more than 20 years of my researches there. It is possible, therefore, that the 2 paratypes of *P. nipponicella* from Sapporo are, in reality, misidentified specimens of *P. similis* or *P. acutissimae*.

***Phyllonorycter similis* sp. nov.**

(Figs. 2; 4, C-D & I-J; 5, C-D & G; 6, B)

Lithocolletis nipponicella: KUMATA, 1963, Ins. matsum. **25**: 79 (part); *ibid.*, 1966, ditto **29**: 21 (misidentification).

♂♀. Expanse of wings: 6.5–7.5 mm (7.1 mm in average of 15 specimens) in early generations; 7.2–9.4 mm (8.8 mm in holotype, and 8.5 mm in average of 16 specimens) in late generations. Length of fore wing: 3.2–3.7 mm (3.5 mm in average of 15 specimens) in early generations; 3.5–4.6 mm (4.3 mm in holotype, and 4.2 mm in average of 16 specimens) in late generations.

Colour: The colour description of “*L. nipponicella*” in my 1963 paper was based on *P. similis*, but holds good for the true *P. nipponicella*. For there is no difference in colour between *P. similis* and *P. nipponicella*. Since a new colour description is given above for *P. nipponicella*, it may not be necessary to give another colour description for *P. similis*.

Male genitalia: Very similar to those of *P. nipponicella*, but differing as follows: —Valva somewhat crescent-shaped in material mounted on slide, with apex more narrowly round than in *P. nipponicella*, setae distributed almost wholly on apical part of discal area of valva, thus there being no glabrous area on the disc near the apex. Flap-like 8th sternite a little more strongly tapered towards apex, lateral margins slightly constricted near apex, and apical margin more deeply incised or concave. (Seventy-five slides examined.)

Female genitalia: Symmetrical. Papilla analis rather short, sparsely covered with moderately long setae and also with microspines on almost whole surface; apophysis posterioris long, slightly widened on basal half. Eighth abdominal segment short, weakly sclerotized, not covered with scales; apophysis anterioris 1/2 to 1/3 as long as apophysis posterioris. Sinus vaginalis very large; sterigma weakly sclerotized, with a heavily sclerotized band transversely running on ventrum and arched anteriorly; ductus bursae weakly membranous, long, slender; corpus bursae globular or pyriform, with a sclerotized patch having a pair of signa in the centre, and with a round scobinated patch. Ductus seminalis arising from anterior margin of sterigma; bulla seminalis globular, as large as or slightly larger than corpus bursae, sparsely scobinated with microscopic spines on inner surface. (Sixty slides examined.)

Specimens examined: 304♂♂ & 234♀♀. Holotype: ♂, Yûbari, Sorati, Hokkaidô, em. 6/v/1978, ex *Quercus mongolica* var. *grosseserrata* (1933),¹⁾ Genitalia slide no. Grc-2809, KUMATA.

Paratypes: HOKKAIDÔ—2♂♂ & 3♀♀, Kenebetu, Nemuro, em. 30/i-1/ii/1956, ex *Q. dentata* (2), determined as *nipponicella* by KUMATA, 1959; 9♂♂ & 8♀♀, ditto, em. 16/v-10/vi/1980, ex *Q. dentata* (2010); 4♂♂ & 1♀, Peipan, Asahigawa,

¹⁾ Numerals within parentheses after the plant name are my breeding numbers. The same numbers are written on the host labels of parasites that emerged from the same breeding series.

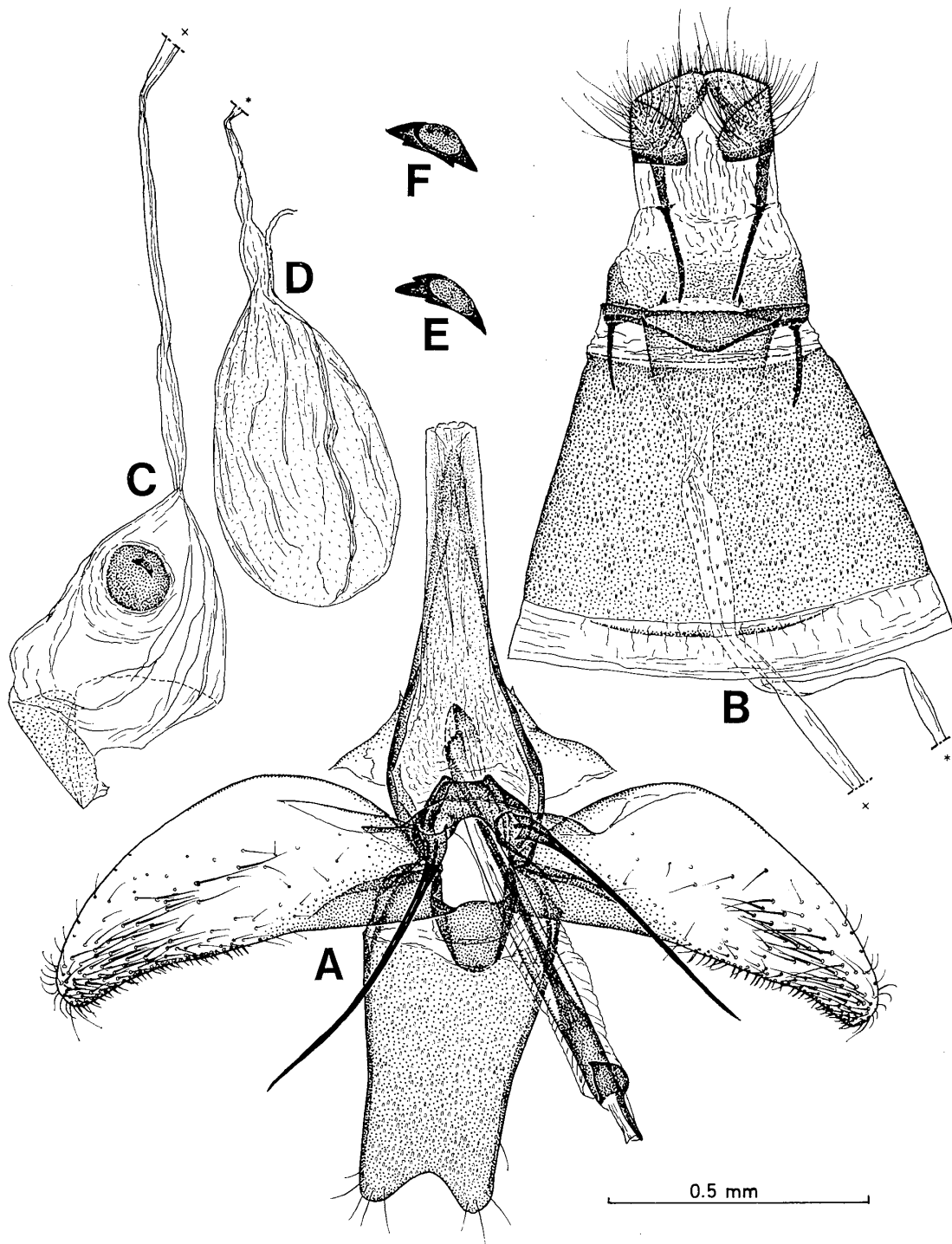


Fig. 2. *Phyllonorycter similis*, sp. nov. A: Male genitalia (holotype, Grc-2809). B: Female genitalia in ventral view (Apoi, Hidaka, Hokkaidô, Grc-2870). C: Corpus bursae (ditto). D: Bulla seminalis (ditto). E: Signum enlarged (ditto). F: Ditto (Todai, Ina, Nagano-ken, Grc-2862).

em. 2-5/viii/1966, ex *Q. mongolica* var. *grosseserrata*; 1♂ & 1♀, Apoi, Hidaka, em. 24-25/viii/1957, ex *Q. m.* var. *grosseserrata*, determined as *nipponicella* by KUMATA, 1961; 7♂♂ & 7♀♀, ditto, em. 17-22/iv/1975, ex *Q. m.* var. *grosseserrata* (1384); 8♂♂

& 3♀♀, with the same data as holotype; 1♀, Eniwa, Isikari, 6/vi/1961, determined as *nipponicella* by KUMATA, 1961; 1♀, Nopporo, Isikari, em. 16/vii/1956, ex *Q. m. var. grosseserrata* (184), determined as *nipponicella* by KUMATA, 1961; 6♂♂ & 2♀♀, Sapporo, em. 17/xii/1955–25/i/1956, ex *Q. dentata*, determined as *nipponicella* by KUMATA, 1957; 1♂ (USNM), ditto, em. 27/i/1956, ex *Q. dentata*, determined as *nipponicella* by KUMATA, 1957; 1♂, ditto, 7/vii/1956, ex *Q. dentata* (184), determined as *nipponicella* by KUMATA, 1961; 1♀, ditto, em. 20/xii/1956, ex *Q. m. var. grosseserrata*, determined as *nipponicella* by KUMATA, 1961; 2♀♀, ditto, em. 6–16/vii/1956, ex *Q. m. var. grosseserrata* (184), determined as *acutissimae* (paratype) by KUMATA, 1963; 2♂♂, ditto, em. 17–21/vii/1959, ex *Q. m. var. grosseserrata* (482), determined as *nipponicella* by KUMATA, 1961; 2♂♂, ditto, em. 16–18/vii/1963, ex *Q. m. var. grosseserrata*; 3♀♀, ditto, em. 15–21/viii/1964, ex *Q. dentata*; 1♂, ditto, em. 12/vii/1977, ex *Q. m. var. grosseserrata*; 27♂♂ & 18♀♀, Moiwa, Sapporo, em. 29/vi–18/vii/1978, ex *Q. m. var. grosseserrata*, S. MATSUDA leg.; 10♂♂ & 6♀♀, ditto, em. 25/x–16/xi/1978, ex *Q. m. var. grosseserrata*, S. MATSUDA leg.; 1♀, Teine, Isikari, em. 27/vii/1967, ex *Q. m. var. grosseserrata*; 1♂ & 1♀, Zyôzankei, em. 21–27/vii/1956, ex *Q. dentata* (184), determined as *nipponicella* by KUMATA, 1961; 2♀♀, ditto, em. 26/vii/1963, ex *Q. m. var. grosseserrata*; 1♀, Zenibako, Siribesi, 7/vi/1956, determined as *nipponicella* by KUMATA, 1961; 1♂ & 2♀♀, Tomakomai, Iburi, em. 30/iv–2/v/1970, ex *Q. m. var. grosseserrata* (958); 21♂♂ & 23♀♀, Ônuma, Osima, em. 4–8/v/1978, ex *Q. m. var. grosseserrata* (1787); 134♂♂ & 97♀♀, ditto, em. 7/xii/1978–21/i/1979, ex *Q. m. var. grosseserrata*, S. MATSUDA leg.; 13♂♂ & 15♀♀, ditto, em. 9–20/vii/1978, ex *Q. m. var. grosseserrata*, S. MATSUDA leg.; 1♂ & 2♀♀, ditto, em. 6–11/v/1978, ex *Q. serrata*; 4♂♂ & 3♀♀, Okusiri-Tô, em. 21/vii/1958, ex *Q. m. var. grosseserrata*, determined as *nipponicella* by KUMATA, 1961. HONSYÛ——4♂♂, Morioka, em. 6–13/vii/1957, ex *Q. serrata*, determined as *nipponicella* by KUMATA, 1961; 3♂♂, Tunagi, Morioka, em. 30/iv/1970, ex *Q. m. var. grosseserrata* (1001); 2♀♀, ditto, em. 30/iv/1970, ex *Q. serrata*; 1♂, Ryôtu, Sadoga-Sima, em. 23/vii/1958, ex *Q. acutissima*, H. ABE leg., determined as *nipponicella* by KUMATA, 1961; 1♂ (EUOP), Tobira, Nagano-ken, 16/v/1953, T. KODAMA leg.; 1♂ (EUOP), Utukusigahara, Nagano-ken, 17/v/1953, T. KODAMA leg.; 1♀, Agematu, Kiso, Nagano-ken, em. 28/iii/1958, ex *Q. serrata*, K. KAMIJO leg., determined as *nipponicella* by KUMATA, 1959; 1♂, Misuzuko, Nagano-ken, em. 28/iii/1958, ex *Q. serrata*, K. KAMIJO leg., determined as *nipponicella* by KUMATA, 1959; 1♀ (USNM), ditto, em. 8/iv/1958, ex *Q. dentata*, K. KAMIJO leg., determined as *nipponicella* by KUMATA, 1959; 1♀, Todai, Ina, Nagano-ken, em. 15/vii/1975, ex *Q. serrata* (1417); 5♂♂ & 6♀♀, ditto, em. 20–26/iv/1976, ex *Q. serrata* (1606 & 1607); 2♂♂ & 3♀♀, ditto, em. 21–24/v/1976, ex *Q. m. var. grosseserrata* (1619); 3♂♂ & 1♀, ditto, em. 22–24/iv/1976, ex *Q. dentata* (1614); 3♀♀, Ôtaki, Kiso, Nagano-ken, em. 21–23/iv/1976, ex *Q. m. var. grosseserrata* (1538); 2♂♂, Kaida, Kiso, em. 16–17/vii/1975, ex *Q. serrata* (1451); 11♂♂ & 3♀♀, Kisohukusima, Nagano-ken, em. 7–17/vii/1975, ex *Q. serrata* (1428); 4♂♂ & 3♀♀, ditto, em. 20–22/iv/1976, ex *Q. serrata* (1511); 1♂, Hida, Gihu-ken, em. 25/vii/1954, ex *Quercus* sp., S. ISSIKI leg., determined as *nipponicella* by KUMATA, 1961; 1♂, (USNM), Kyôto, 15/v/1932, S. ISSIKI leg., determined as *nipponicella* by ISSIKI. SIKOKU——1♂, Ino, Kôti-ken, em. 18/vi/1957, ex *Q. serrata*, determined as *nipponicella* by KUMATA, 1961; 1♀, Sara-dake, 27/v/1956, M. OKADA leg., deter-

mined as *nipponicella* by KUMATA, 1961. KYÛSYÛ—1♂, Hikosan, Hukuoka-ken, em. 23/vi/1965, ex *Q. serrata*; 1♂ & 1♀, Kamitusima, Tu-Sima, em. 16–19/v/1980, ex *Q. dentata* (2136). SATUNAN IS.—1♂ & 1♀, Nisinomote, Tanega-Sima, em. 21/vi–1/vii/1965, ex *Q. dentata*, determined as *nipponicella* by KUMATA, 1966. KOREA—1♂ (KIAS), Mt. Sogri, em. 11/viii/1977, ex *Q. serrata*, H. KUROKO leg.; 1♀ (KIAS), Mt. Chiag, em. 27/vi/1977, ex *Q. serrata*, H. KUROKO leg.

Other specimen: 1♀, Misuzuko, Nagano-ken, Honsyû, em. 8/iv/1958, ex *Q. acutissima*, K. KAMIJO leg., determined as *nipponicella* by KUMATA, 1959.

Food plants: *Quercus acutissima*, *Quercus dentata*, *Quercus mongolica* var. *grosseserrata* and *Quercus serrata* (Fagaceae) in Japan; and *Quercus serrata* in Korea.

Distribution: Japan (Hokkaidô; Honsyû; Sikoku; Kyûsyû; Satunan Is.); and Korea.

Phyllonorycter acutissimae (KUMATA)

(Figs. 3; 4, E–F, & K–L; 5, E–F & H; 6, C)

Lithocolletis acutissimae KUMATA, 1963, Ins. matsum. 25: 81, fig. 20.

♂♀. Expanse of wings: 5.8–7.2 mm (6.5 mm in average of 15 specimens) in early generations; 7.2–9.0 mm (8.0 mm in holotype, and 7.8 mm in average of 16 specimens) in late generations. Length of fore wing: 2.8–3.6 mm (3.2 mm in average of 15 specimens) in early generations; 3.5–4.8 mm (4.0 mm in holotype, and 3.9 mm in average of 16 specimens) in late generations.

Colour: This species does not differ in colour pattern from *P. nipponicella* and *P. similis*. The colour description for *P. nipponicella* holds good for *P. acutissimae*, too.

Male genitalia: Symmetrical. Valva about as long as tegumen, somewhat banana-shaped; costal margin arched, ventral margin obtusely bent downwardly at middle, and apical margin narrowly rounded in material mounted on slide; costal process conical, about twice as long as wide, with a filament-like seta about 2/3 as long as valva and bent downwardly at its apical 1/3; slender to moderately stout setae densely distributed on ventral half of disc at and near apex of valva, then rather sparsely on disc from middle to base of valva. Flap-like 8th sternite slightly shorter than valva, parallel-sided, with apical margin more deeply concave than in *P. nipponicella* and *P. similis*. Aedoeagus roundly incised near apex, with an apical barb minute or absent. Tegumen and saccus similar to those of the 2 preceding species. (Thirty-three slides examined.)

Female genitalia: Very similar to those of *P. similis*, but differing as follows: — Sinus vaginalis moderately large, slightly smaller than that of *P. similis*; sterigma sclerotized on its caudal half, with cephalic margin of sclerotized part sinuate, without any band. Bulla seminalis globular, the inner surface not covered with microscopic spines. (Thirty slides examined.)

Specimens examined: 38♂♂ & 35♀♀. Type-specimens: Holotype—♂, Nagano-si, Honsyû, em. 10/iv/1958, ex *Quercus acutissima*, K. KAMIJO leg., Genitalia slide no. Grc-502, KUMATA. Paratypes—1♂, Sapporo, Hokkaidô, em. 11/vii/1956, ex *Q. mongolica* var. *grosseserrata* (184); 2♂♂ & 1♀, Teine, Hokkaidô, em. 19/vii/1956, ex *Q. m.* var. *grosseserrata* (184); 1♂ & 4♀♀, with the same data as holo-

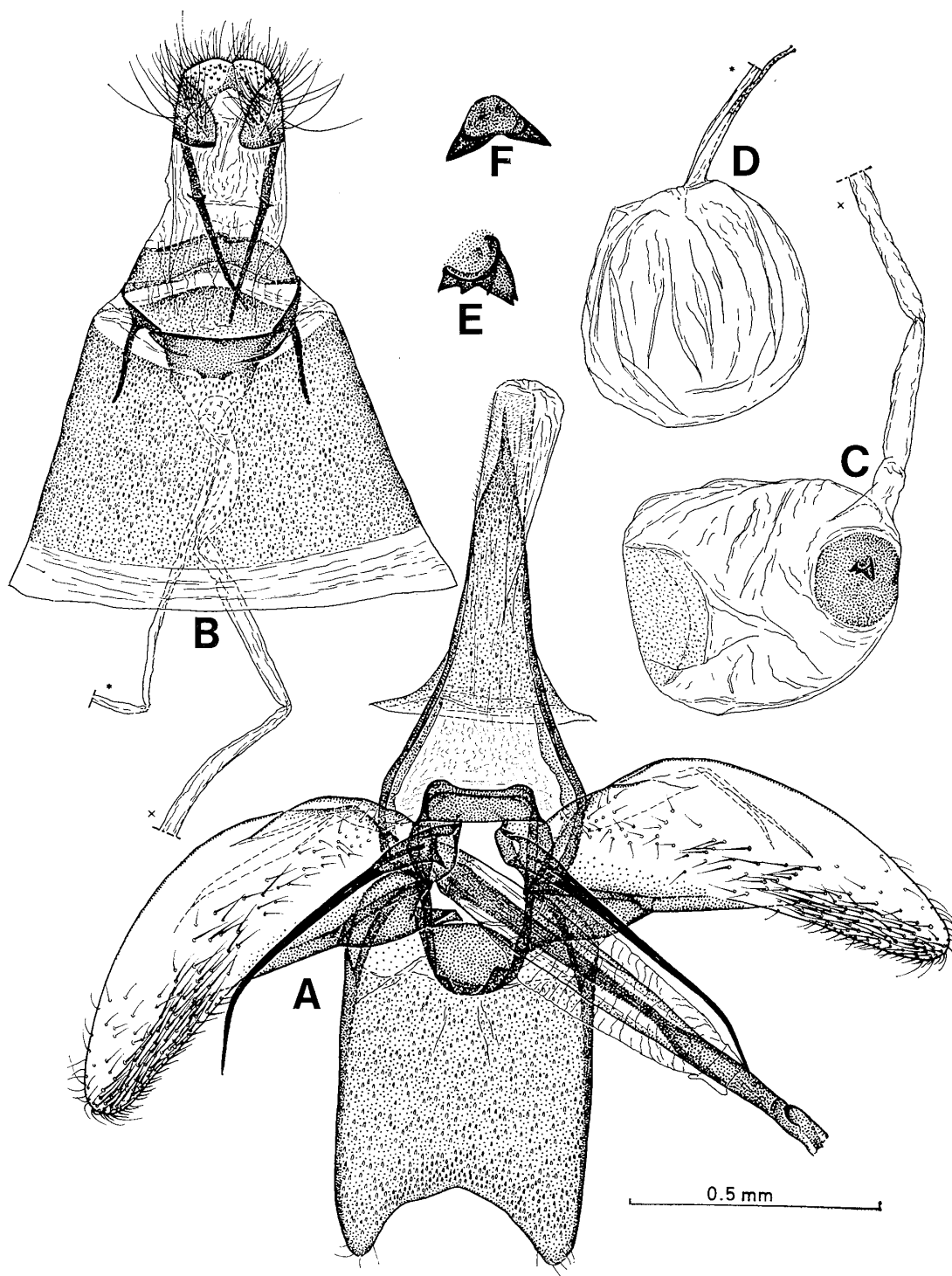


Fig. 3. *Phyllonorycter acutissimae* (KUMATA). A: Male genitalia (Kii-Ôsima, Wakayama-ken, Grc-2825). B: Female genitalia in ventral view (Nagano-si, Grc-2878). C: Corpus bursae (ditto). D: Bulla seminalis (ditto). E: Signum enlarged (ditto). F: Ditto (Izuhara, Tu-Sima, Grc-2837).

type except date emerged, 5-14/iv/1958; 1♀, Kawatinagano-si, Ôsaka, Honsyû, em. 8/vii/1957, ex *Q. acutissima*; 1♂, Ino, Kôti-ken, Sikoku, em. 16/vi/1957, ex *Castanea crenata* (249, a); 1♂, Mikazuki-yama, Hukuoka-ken, Kyûsyû, em. 16/vi/1957, ex *Q. serrata*.

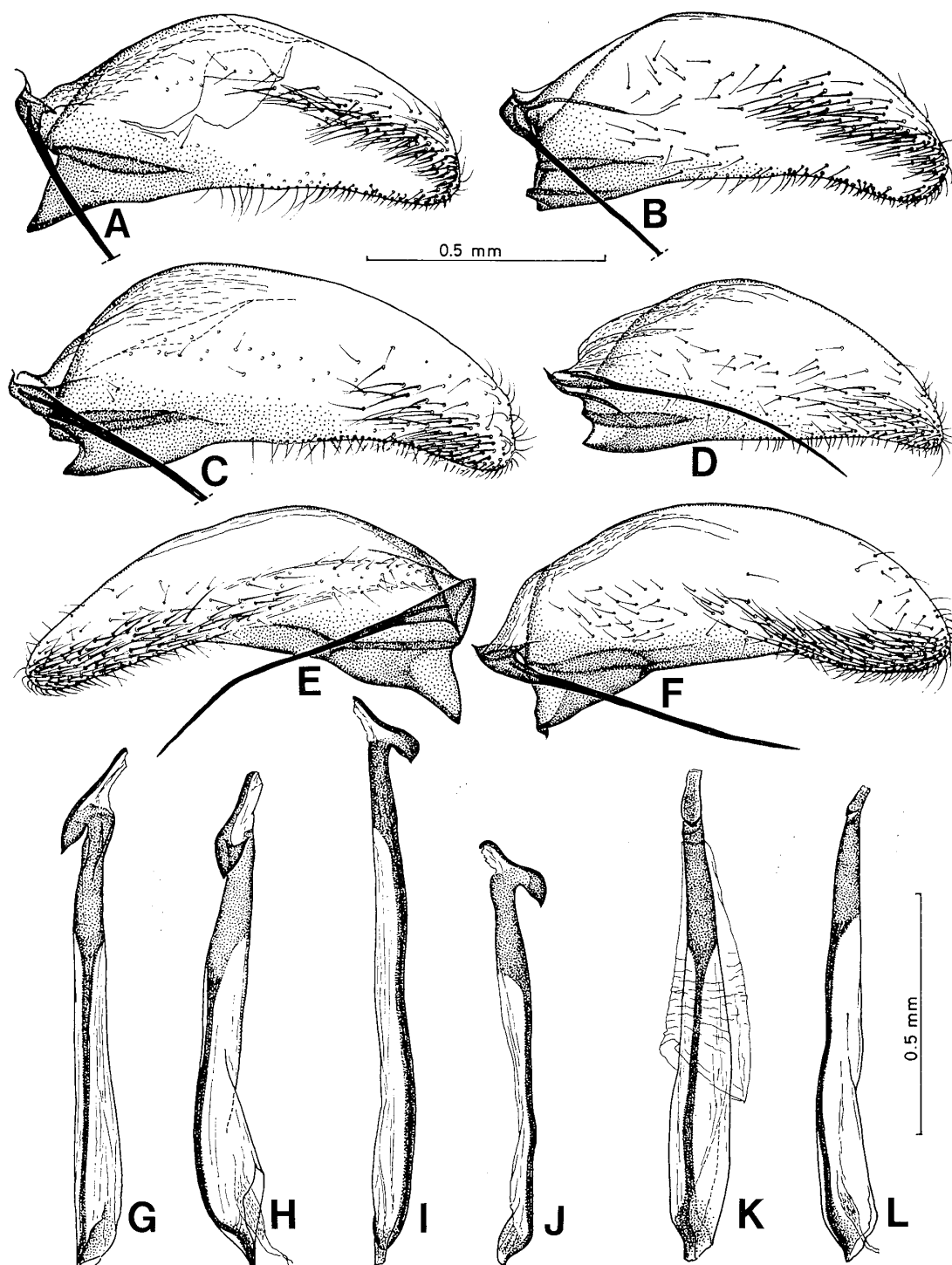
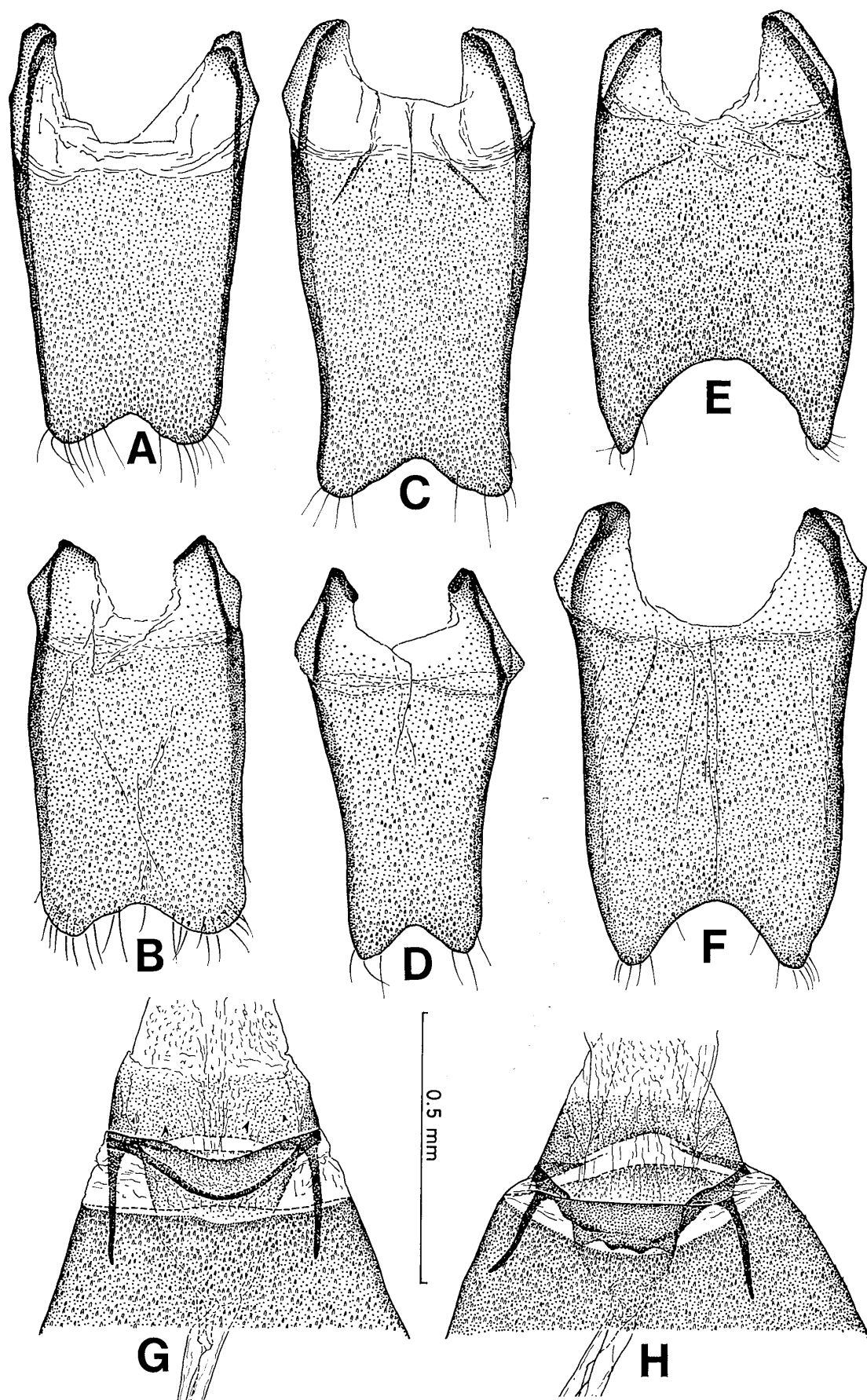


Fig. 4. *Phyllonorycter* spp.: Valva (A-F) and aedeagus (G-L). A, G: *P. nipponicella* (ISSIKI) (Kinki, Kii, Hasimoto, Grc-2908). B, H: Ditto (Suweon, Korea, Grc-2787). C, I: *P. similis* sp. nov. (Kenebetu, Nemuro, Hokkaidô, Grc-2864). D, J: Ditto (Mt. Sogri, Korea, Grc-2781). E, K: *P. acutissimae* (KUMATA) (holotype, Grc-502). F, L: Ditto (Suweon, Korea, Grc-2784).

Further specimens: HOKKAIDÔ—3♀♀, Moiwa, Sapporo, em. 2-6/v/1970, ex *Q. m.* var. *grosseserrata* (1009); 1♀, ditto, em. 12/vii/1977, ex *Q. m.* var. *grosseserrata* (1713); 1♂ & 3♀♀, ditto, em. 22/xi-13/xii/1978, ex *Q. m.* var. *grosseserrata*, S.



MATSUDA leg.; 7♂♂ & 5♀♀, ditto, em. 12/vi–20/vii/1958, ex *Q. m.* var. *grosseserrata*, S. MATSUDA leg.; 1♂, Ônuma, Osima, em. 2/v/1978, ex *Q. m.* var. *grosseserrata* (1787); 1♂, ditto, em. 15/vii/1978, ex *Q. m.* var. *grosseserrata*, S. MATSUDA leg. HONSYÛ——1♂, Kisohukusima, Nagano-ken, em. 19/iv/1976, ex *Q. serrata* (1511); 1♂ & 2♀♀, Kaida, Kiso, Nagano-ken, em. 20–22/iv/1976, ex *C. crenata* (1573); 1♂ & 1♀ (USNM), Sakai, Kinki, em. 30/iii–8/iv/1955, ex *Q. acutissima*, S. ISSIKI leg.; 1♂ & 1♀ (EUOP), ditto, em. 24/iv/1967, ex *Q. acutissima*, H. KUROKO leg.; 4♂♂ & 4♀♀ (EUOP), ditto, em. 6–13/vi/1967, ex *Q. acutissima*, H. KUROKO leg.; 1♂ (USNM), Nisinomiya, Kinki, em. 2/vii/1949, ex *Q. acutissima*, S. ISSIKI leg.; 1♂ (EUOP), Iwakakisan, Kawati, Ôsaka, 28/v/1955, T. YASUDA leg.; 1♂, Kii-Ôsima, Wakayama-ken, em. 5/x/1974, ex *Q. acutissima*; 1♀ (EUOP), Usa, Yamaguti, 30/v/1953, T. KODAMA leg. KYÛSYÛ——2♂♂ & 1♀ (EUOP), Ikenoue, Yamato-mati, Saga-ken, 18/iv/1961, M. MAEBARA leg.; 1♂ & 1♀, Hikosan, Hukuoka-ken, em. 1/vii/1965, ex *Q. acutissima*; 1♀, Izuhara, Tu-Sima, em. 22/vi/1980, ex *C. crenata* (2054); 1♂, ditto, em. 20/v/1980, ex *Q. serrata* (2065); 1♂, ditto, em. 19/v/1980, ex *Q. variabilis* (2070); 1♂, Kagosima-si, em. 2/iii/1974, ex *Q. acutissima*. KOREA——2♂♂ & 3♀♀ (KIAS), Suweon, 2–4/v/1977, Y. Y. HA leg.; 1♀ (KIAS), ditto, 8/v/1977, K. T. PARK leg.; 1♂ (KIAS), ditto, 2/viii/1976, K. B. UHM leg.; 1♀ (KIAS), ditto, em. 14/iii/1977, ex *Quercus* sp., J. C. PAIK leg.; 1♂ (KIAS), Mt. Suri, Suweon, 22/iv/1976, K. T. PARK leg.

Food plants: *Quercus acutissima*, *Quercus mongolica* var. *grosseserrata*, *Quercus serrata*, *Quercus variabilis* and *Castanea crenata* (Fagaceae) in Japan.

Distribution: Japan (Hokkaidô; Honsyû; Sikoku; Kyûsyû); and Korea (new record).

Preliminary Discussion on the Host Association and Distribution of the *Nipponicella* Complex

The vast majority of insect specimens used in this paper were reared from larvae mining in the leaves of food plants. In Table 1 are summarized the host data of those reared specimens. These data may not be adequate for discussing about the host association, because they were not gathered according to a plan designed for this purpose. However, the table shows some tendency in the host association of the members of the *nipponicella* complex.

P. nipponicella has been reared too infrequently to know its main food plants. Five specimens were reared from *Q. acutissima* in Honsyû, and one was reared from *Q. variabilis* in Korea; there is no further authentic record of the species. However, some significance can be ascribed to the fact that *P. nipponicella* has not yet been reared from *Q. mongolica* var. *grosseserrata*, *Q. dentata* and *Q. serrata*, because 49 specimens of *P. similis* have been reared from those hosts within the known range (central Honsyû

Fig. 5. *Phyllonorycter* spp.: Flap-like 8th sternite of male (A–F) and 7th and 8th abdominal segments of female (G, H). A: *P. nipponicella* (ISSIKI) (Grc-2908). B: Ditto (Grc-2785). C: *P. similis*, sp. nov. (Grc-2864). D: Ditto (Grc-2781). E: *P. acutissimae* (KUMATA) (holotype, Grc-502). F: Ditto (Grc-2784). G: *P. similis*, sp. nov. (Todai, Ina, Nagano-ken, Grc-2862). H: *P. acutissimae* (KUMATA) (Izuhara, Tu-Sima, Grc-2837).

Table 1. Rearing records of the *Phyllonorycter nipponicella* complex from food plants.

Food plant	<i>Quercus mongolica</i> var. <i>grosseserrata</i>	<i>Quercus dentata</i>	<i>Quercus serrata</i>	<i>Quercus acutissima</i>	<i>Quercus variabilis</i>	<i>Castanea crenata</i>	Total
<i>P. nipponicella</i>	—	—	—	5 (83.3) [16.1]	1 (16.7) [50]	—	6
<i>P. similis</i>	432 (81.5) [94.3]	46 (8.7) [100]	50 (9.4) [94.3]	2 (0.4) [6.5]	—	—	530
<i>P. acutissimae</i>	26 (44.1) [5.7]	—	3 (5.1) [5.7]	24 (40.6) [77.4]	1 (1.7) [50]	5 (8.5) [100]	59
Total	458	46	53	31	2	5	595

Number in parentheses: percentage of one *Phyllonorycter* species for different host plants. Number in brackets: percentage of one host-plant species for different *Phyllonorycter* species.

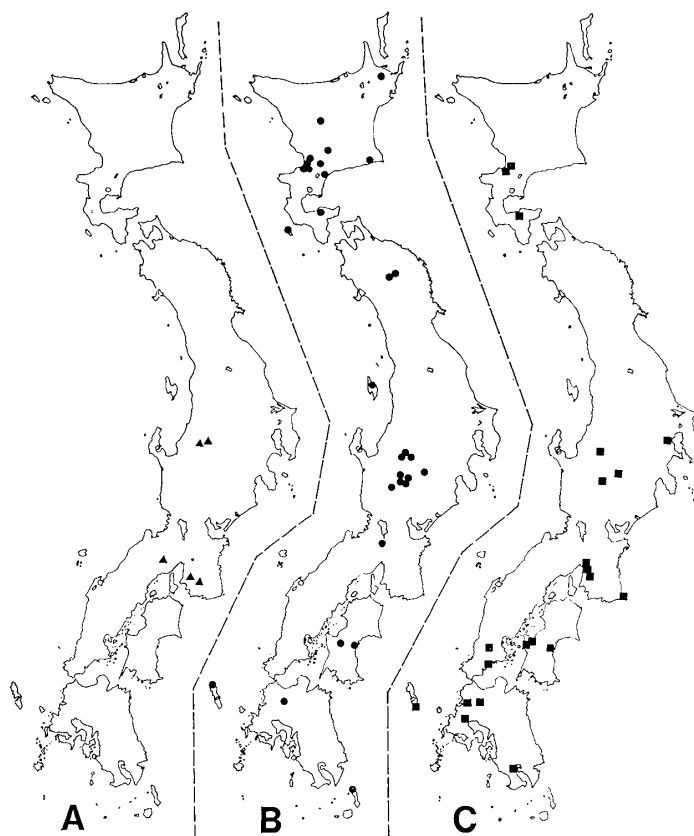


Fig. 6. Distribution maps of *Phyllonorycter* spp. in Japan. A: *P. nipponicella* (Issiki). B: *P. similis*, sp. nov. C: *P. acutissimae* (Kumata).

and Korea) of *P. nipponicella*. This may suggest that *P. nipponicella* does not occur on those plants. *Q. acutissima* is mainly distributed in the southern half of Japan (Fig. 7, A) and Korea, and *Q. variabilis* is, though scarcer, distributed in a range similar to that of *Q. acutissima*. The fact that the collecting localities of the specimens of *P. nipponicella* (Fig. 6, A) are scattered within the distribution of these plants may also suggest that *P. nipponicella* is at least mainly associated with *Q. acutissima* and *Q. variabilis*.

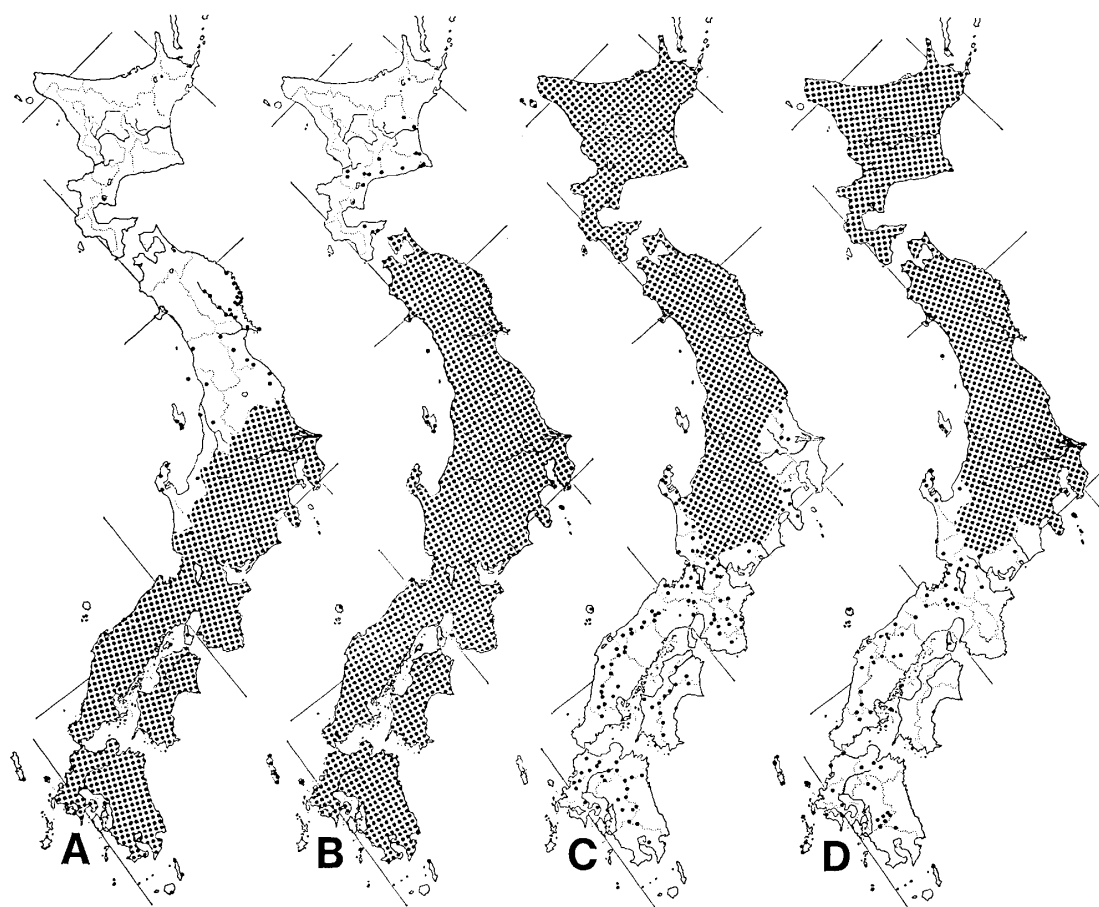


Fig. 7. Distribution maps of *Quercus* spp. in Japan (from KURATA, S., 1971-76, Illustrated important forest trees of Japan, vols. I-V). A: *Q. acutissima*. B: *Q. serrata*. C: *Q. mongolica* var. *grosseserrata*. D: *Q. dentata*.

P. similis has been reared from *Q. m.* var. *grosseserrata*, *Q. dentata*, and *Q. serrata* far more frequently than *P. acutissimae*, amounting to 100% of the rearing records on *Q. dentata* and more than 90% on the other 2 host species combined. The fact that 81.5% of all the reared specimens of *P. similis* are from *Q. m.* var. *grosseserrata* may reflect the relative abundance of that host and the relative ease of making collection from it rather than the actual host preference of *P. similis*. In any case, it is apparent from Table 1 that *P. similis* is more closely associated with *Q. m.* var. *grosseserrata*, *Q. dentata*, and *Q. serrata* than *P. acutissimae*. *Q. m.* var. *grosseserrata* and *Q. dentata* are distributed mainly in Hokkaidô and the northern half of Honsyû, occurring also in southern Japan but only sporadically (Fig. 7, C, D). *Q. serrata* is distributed throughout Japan, though rather rare in Hokkaidô (Fig. 7, B). The combined distribution of the 3 host plants virtually covers Hokkaidô, Honsyû, Sikoku and Kyûsyû, and the data so far accumulated for *P. similis* also cover all these islands (Fig. 6, B).

Among the members of the *nipponicella* complex, *P. acutissimae* has the widest host range, having been reared from all the *Quercus* species cited here, except for *Q. dentata*, and also from *Castanea crenata*. However, *P. acutissimae* has been much less frequently reared from *Q. m.* var. *grosseserrata* and *Q. serrata* than *P. similis* as

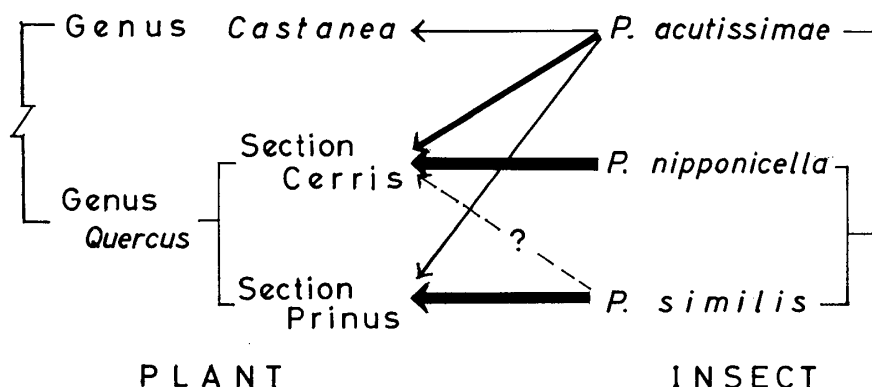


Fig. 8. Schematization of the presumed food-plant preference in the 3 species of the *Phyllonorycter nipponicella* complex, in connection with the presumed relationship among the species and that among the food plants (weight of arrows indicating relative preference).

stated above, and, on the other hand, more frequently from *Q. acutissima* than the other 2 species of the *nipponicella* complex; it is the only member of the complex so far found on *C. crenata*. In central Honsyû, all the food plants cited here, except for *Q. variabilis*, are common, while *P. acutissima* seems to be associated with *Q. acutissima* more frequently than with *C. crenata* and *Q. serrata* (16 specimens reared from *Q. acutissima*, 2 from *C. crenata* and 1 from *Q. serrata*); moreover, it has not been reared so far from *Q. m. var. grosseserrata* in Honsyû at all. These facts may suggest that *P. acutissima* prefers *Q. acutissima* to *C. crenata*, *Q. m. var. grosseserrata* or *Q. serrata*, although it occurs only on *Q. m. var. grosseserrata* in Hokkaidô.

According to KITAMURA and MURATA (1979), *Q. acutissima* and *Q. variabilis* belong to the "section *Cerris*" of the subgenus *Quercus*, while *Q. dentata*, *Q. m. var. grosseserrata* and *Q. serrata* to the "section *Prinus*" of the same subgenus. Thus, *P. nipponicella* seems to be fundamentally different from *P. similis* in food preference: the former seems to be associated exclusively with the section *Cerris*, while the latter at least mainly with the section *Prinus*. One male specimen of *P. similis* was collected from *Q. acutissima* and one female specimen, provisionally identified with *P. similis*, also emerged from *Q. acutissima* at Nagano-ken, Honsyû. These records may be erroneous, but may also suggest that *P. similis* very rarely occurs on the section *Cerris*. The host range of *P. acutissima*, though it extends to the section *Prinus* and the genus *Castanea*, appears to be fundamentally limited to the section *Cerris*.

P. acutissima seems to be isolated among the 3 species, having distinct male and female genital characters. The specificity in host association discussed above also supports this view. *P. acutissima* shares the host plants with both *P. nipponicella* and *P. similis*, while the latter 2 species are different from each other in host range. This can be interpreted that *P. acutissima* is sufficiently differentiated from the other two to coexist on the same host plants. The presumed relationship among the members of the *nipponicella* complex, their association with food plants, and the relationship among the food plants are diagrammed in Fig. 8.

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摘 要

クヌギキンモンホソガ類似種の分類学的再検討並びに 1 新種の記載
(鱗翅目: ホソガ科) (久万田敏夫)

日本ならびに韓国産クヌギキンモンホソガ (*Phyllonorycter nipponicella*) の再検討を行う過程で、従来著者 (KUMATA, 1963, 1966) によってクヌギキンモンホソガと同定されていた標本には 2 種類が含まれていることが判明した。そこで、現在アメリカ国立自然史博物館スミソニアン研究所に保存されているクヌギキンモンホソガのタイプ標本と比較検討した結果、1 部の標本は真のクヌギキンモンホソガと同定されるものであるが、他の大部分は新種に含まれるものであり、*Phyllonorycter similis* (ミスジキンモンホソガ) の名前で記載した。ニセクヌギキンモンホソガ (*Phyllonorycter acutissimae*) を含めて、これら 3 種は色彩斑紋上に明確な区別がなく、クヌギキンモンホソガ類似種として一括して取り扱い、再記載を行うと同時に交尾器による区別点を示した。

用いた標本の大部分は、食草に潜葉していた幼虫から飼育羽化させたものである。そこで、これらの飼育データと分布を基に、昆虫の種類と食草の種類との関係を考察した。クヌギキンモンホソガ

はコナラ属 (Genus *Quercus*) のクヌギ節 (Section *Cerris*: クヌギ・アベマキを含む) を, またミスジキンモンホソガはコナラ節 (Section *Prinus*: カシワ・ミズナラ・コナラを含む) を主要な食草としており, これら 2 種は交尾器におけるわずかな違いの他に食草選択においても区別出来ることを指摘した. ニセクヌギキンモンホソガはクヌギ節を主要な食草としているが, コナラ節およびクリ属 (Genus *Castanea*) をも食し, このことから, 交尾器における比較的顕著な違いをも含めて, 本種はクヌギキンモンホソガおよびミスジキンモンホソガと 共存出来る程度に種分化の進んだ種類であろうと推論した.